U.S. Geological Survey
Office of Surface Water

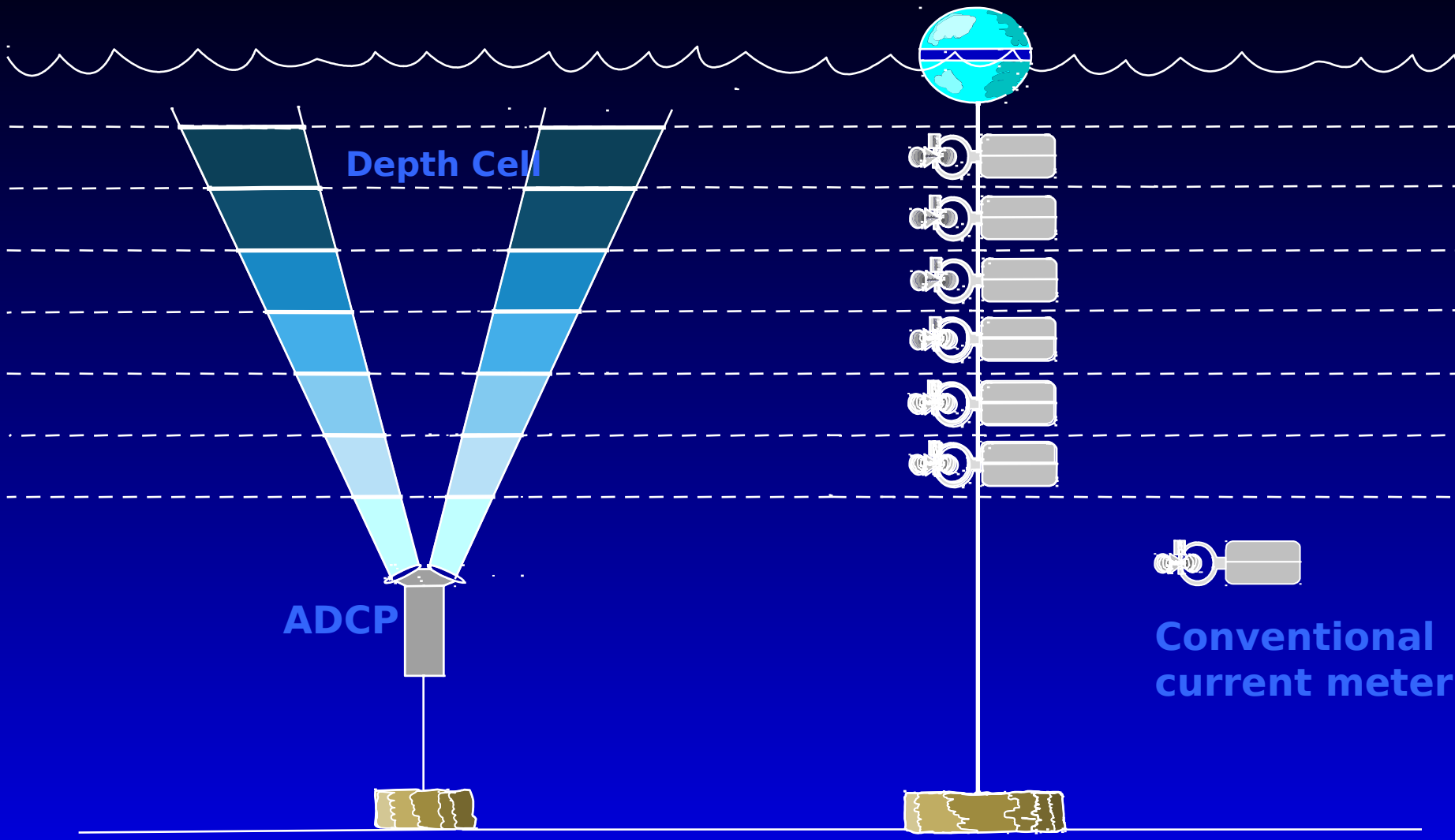
Partnership to Develop ADCP Standards

- **ERDC**

  Coastal and Hydraulics Laboratory
- **USGS**

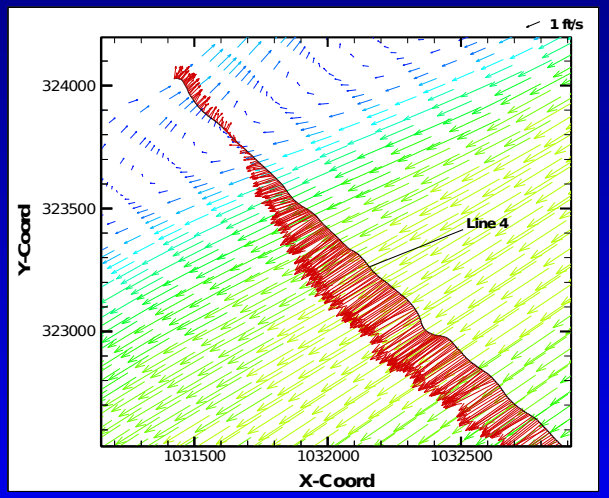
  Office of Surface Water

ADCP 101



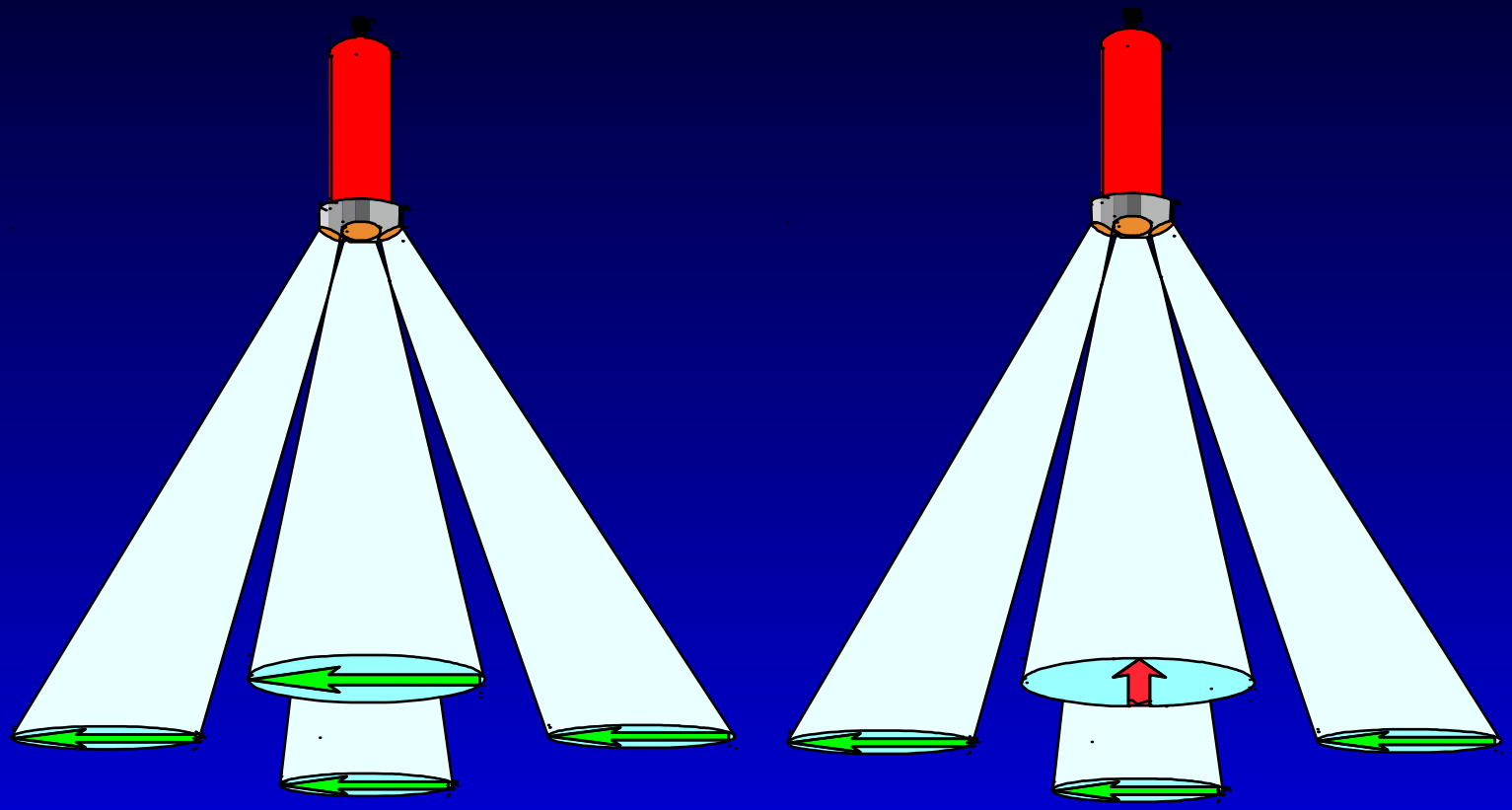
Why

- ADCPs allow unprecedented data collection capabilities
- ADCPs can collect inaccurate data if misapplied
- USGS are using ADCPs in their operational program



Corps Data Collection Effort

Flow Homogeneity

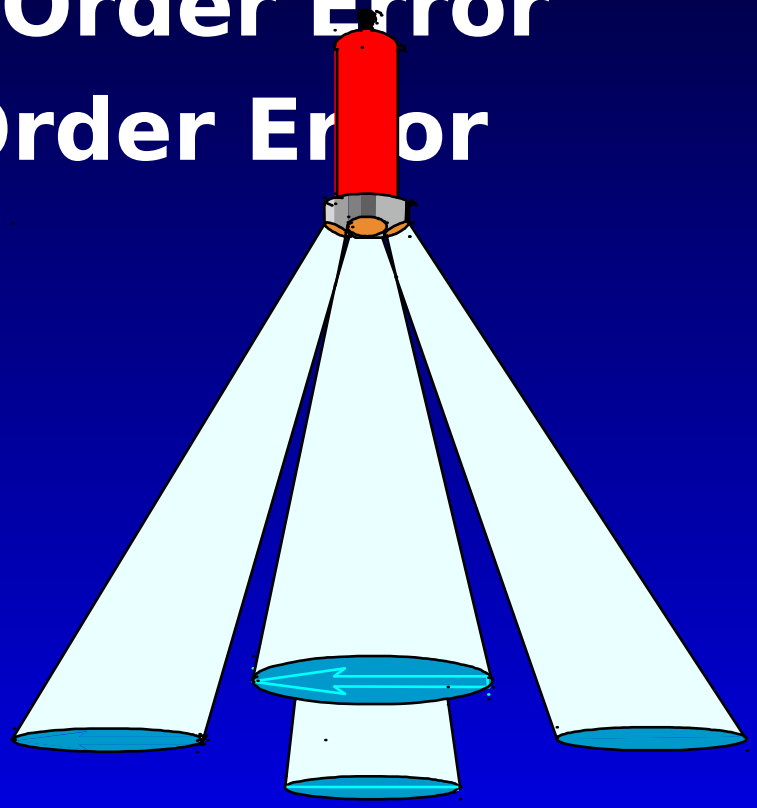


HOMOGENEOUS NONHOMOGENEOUS

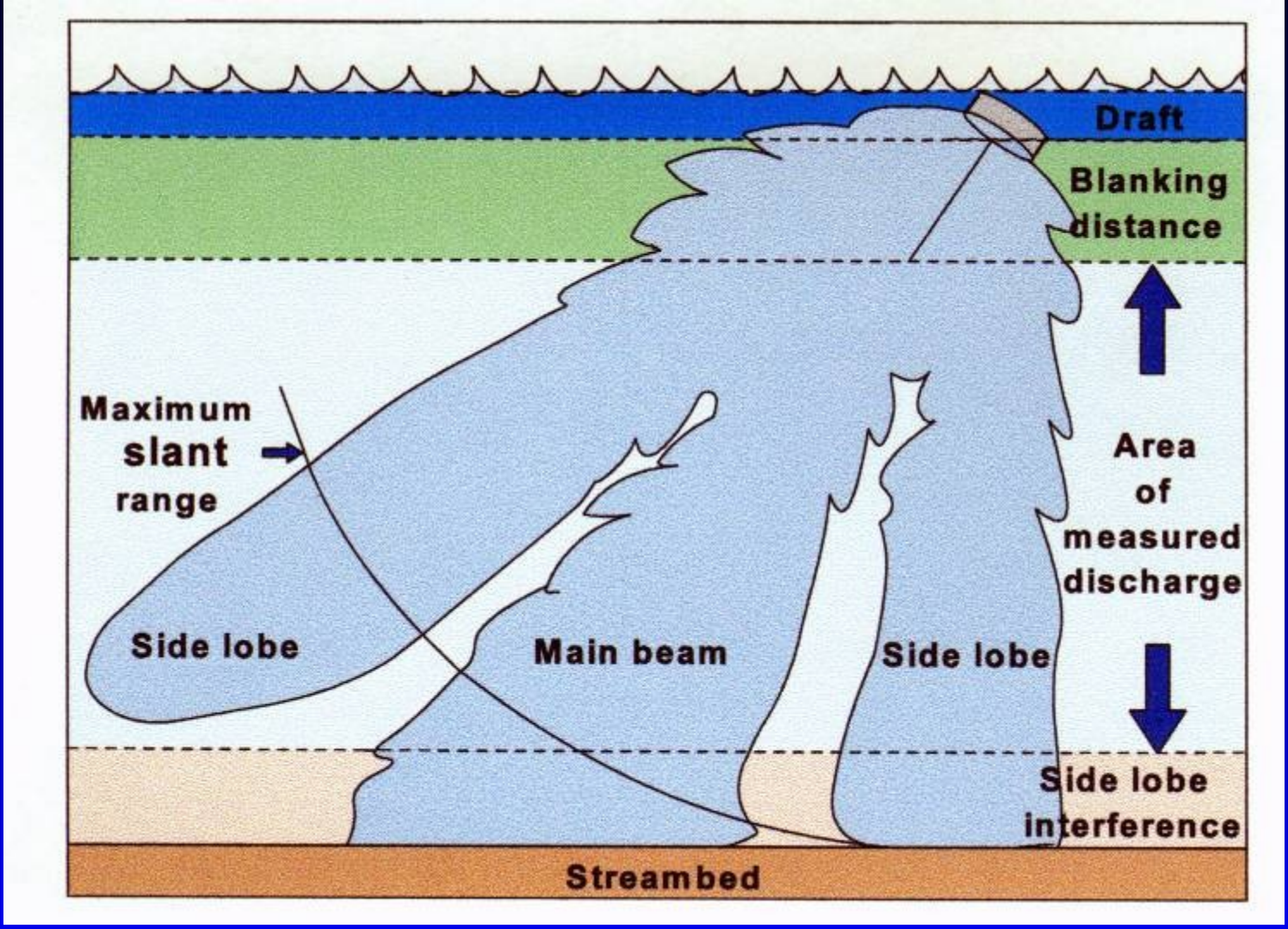
Corps Data Collection Effort

Heave, Pitch, Roll

- Heave => Vertical Velocity
- Pitch => Second Order Error
- Roll => Second Order Error

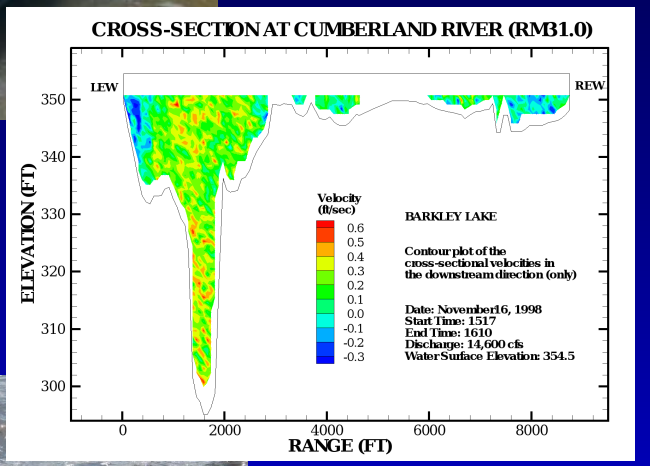


Unmeasured Top and Bottom



Who

- **CHL**
  - Michael Winkler
  - Thad Pratt
  - Terry Waller



- **USGS**
  - David Mueller
  - Chad Wagner
  - Kevin Oberg

Recommendations I

- **Field Data Collection**
  - Field crew needs to understand the use of the data
  - Compass must be calibrated
  - Slow boat speed
  - Collect single ping data
  - Field methods documented

Recommendations II

- Data Processing – ASCII Output
  - Review every transect in WinRiver
  - Set appropriate thresholds to filter data
  - Account for side lobe interference
  - Spatial averaging
    - must use vector averaging
    - Based on :
      - Instrument noise
      - Flow field
      - Desired spatial resolution
    - Account for unmeasured areas
  - Data processing methods documented

Recommendations III

- **Data Processing – Raw Data Files**
  - **Must apply**
    - **Boat speed**
    - **Compass heading/corrections**
    - **Side lobe interference**
  - **Generally not recommended unless you fully understand raw data files.**

What

- **Test Plan Deliverables**
  - Technical Report on Discharge Measurements
  - Technical Report on Velocity Measurements
  - Processing Software (If Additional Funded)
  - Quick sheets for Discharge
  - Quick sheets for Velocity
  - Note Sheets for Discharge
  - Note Sheets for Velocity
  - Quick Sheets for Velocity Processing

When

- Oct 2006
- Deliverables:
- TechNote (Study Plan)
- Draft Discharge Sections:
- Introduction
- Predeployment
- Field Procedures
- Initiate Software Development (if funds are available).
- Feb 2007
- TechNote on Field Notes for Discharge
- Quick sheets for Q measurements
- Jul 2007
- Deliverables:
- Velocity Software (if funding available)
- Draft of remaining discharge report sections (less uncertainty)
- Oct 2007
- Deliverables:
- Uncertainty method for discharge (tentative)
- Draft Discharge Measurement Guidance

- **POC’s**

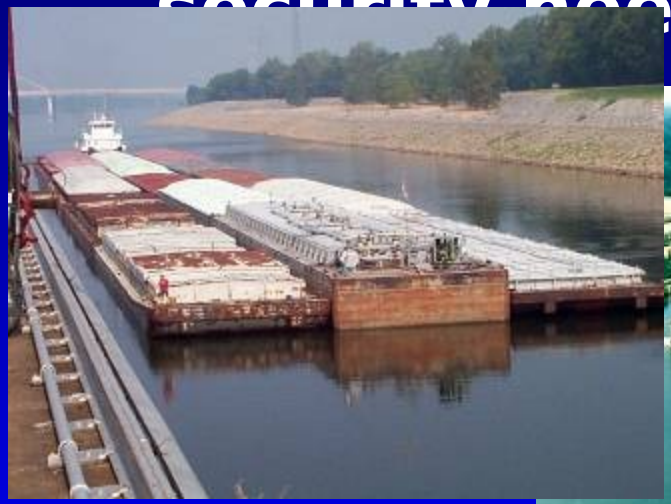
USGS, Mr. Dave Muelller
dmueller@usgs.gov

Corps, Mr. Michael Winkler
michael.f.winkler@usace.army.mil

Corps Navigation Mission

Provide

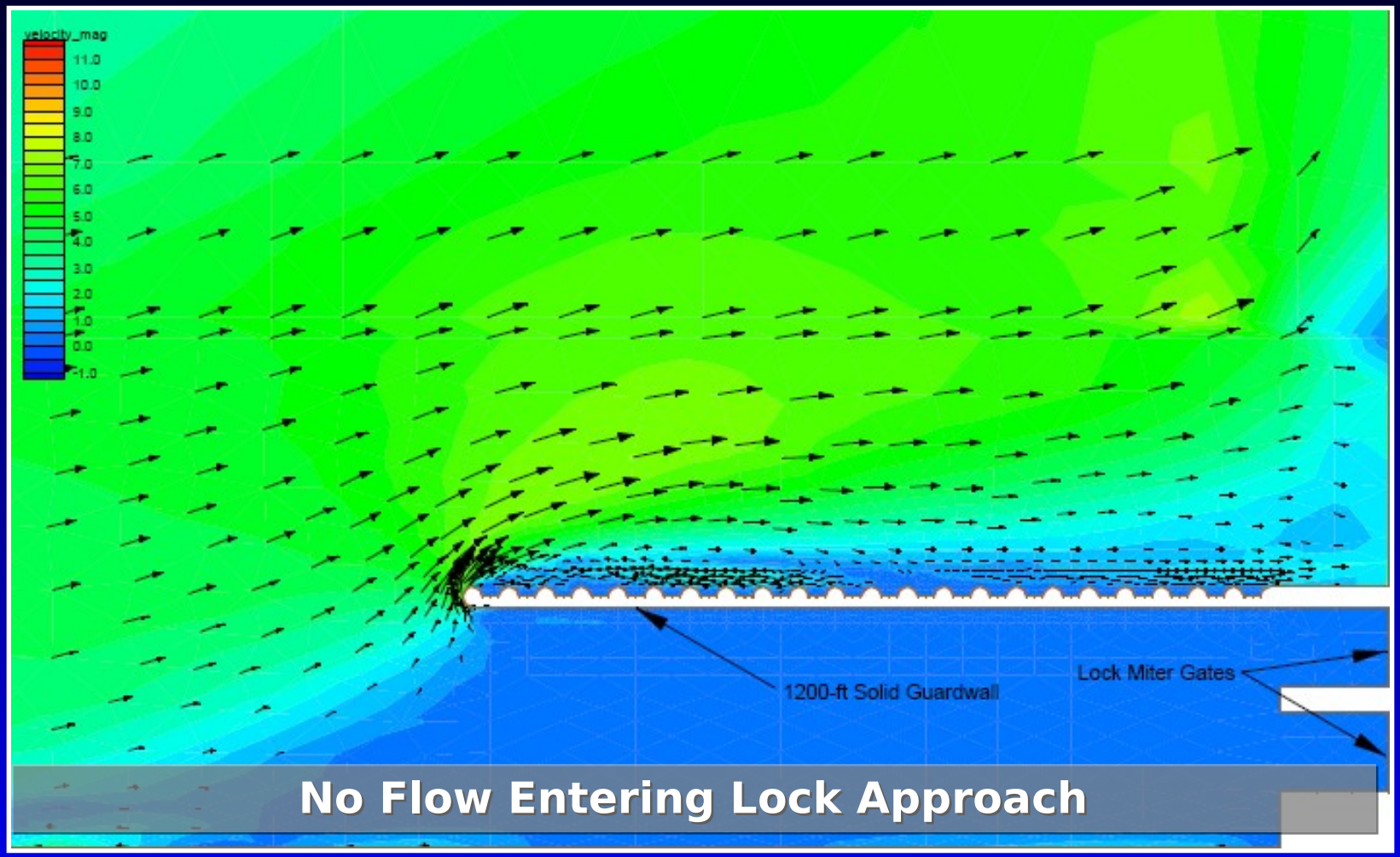
safe,reliable,efficient,effective and environmentally sustainable waterborne transportation systems for movement of com nal security needs, and re



Lock and Dam 3

- Barge sunk in dam gates August 1,1993
  - Only 4 roller gates
- 11 into-dam accidents since 1968

Outdraft


velocity_mag
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
1200-ft Solid Guardwall
Lock Miter Gates
No Flow Entering Lock Approach

Tom Bevill Outdraft

Tom Bevill – Confetti Picture

Upstream View of the Model

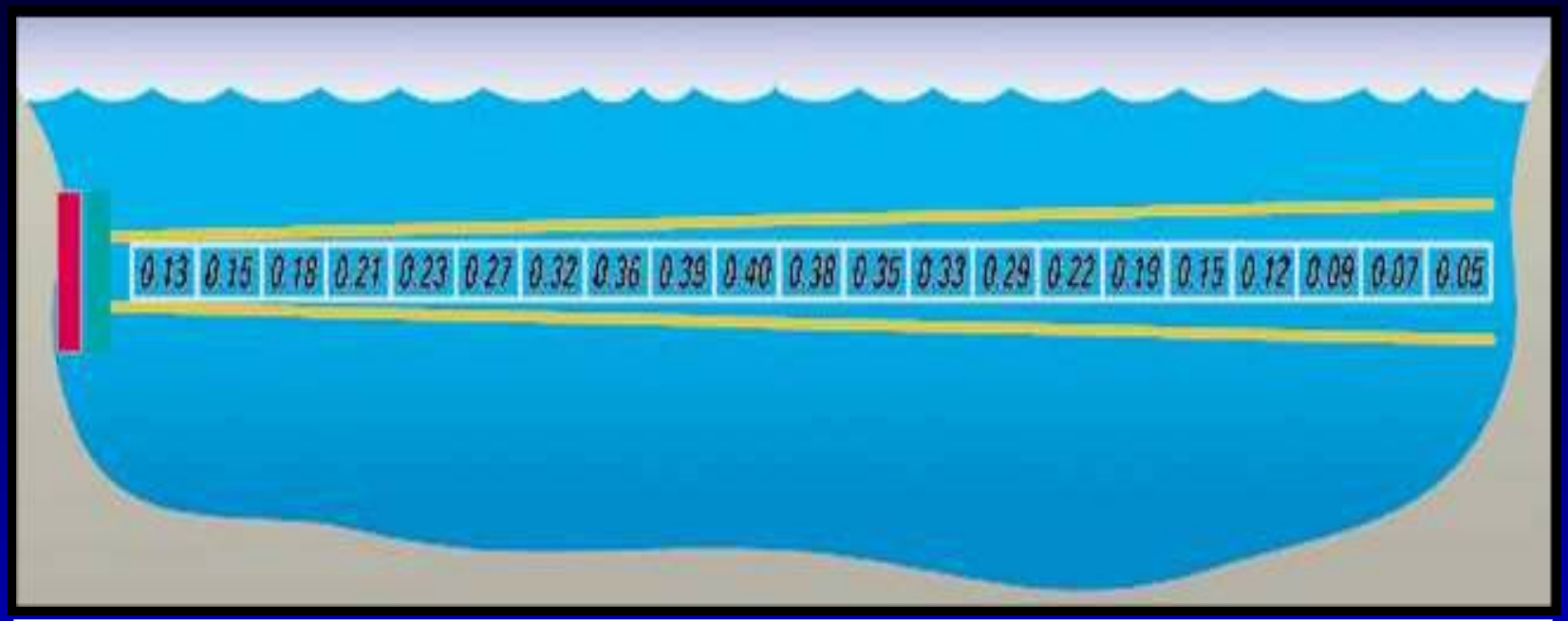
Bull Nose Guard Wall

H-ADCP Doppler Unit

H-ADCP Mount

H-ADCP Mounted

ADCP Measurements



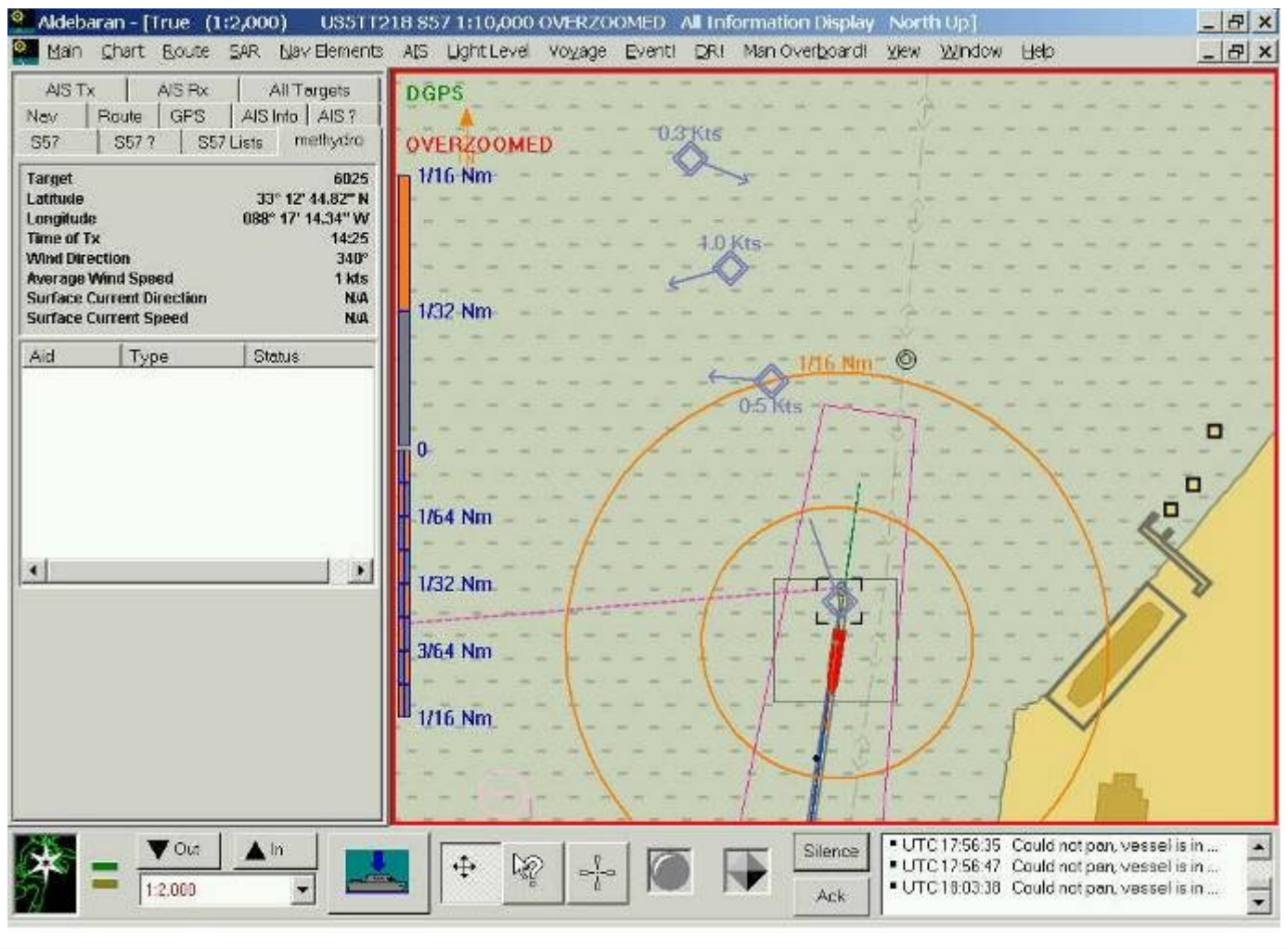
Separate Velocity Measurements - BINS

Wind Meter

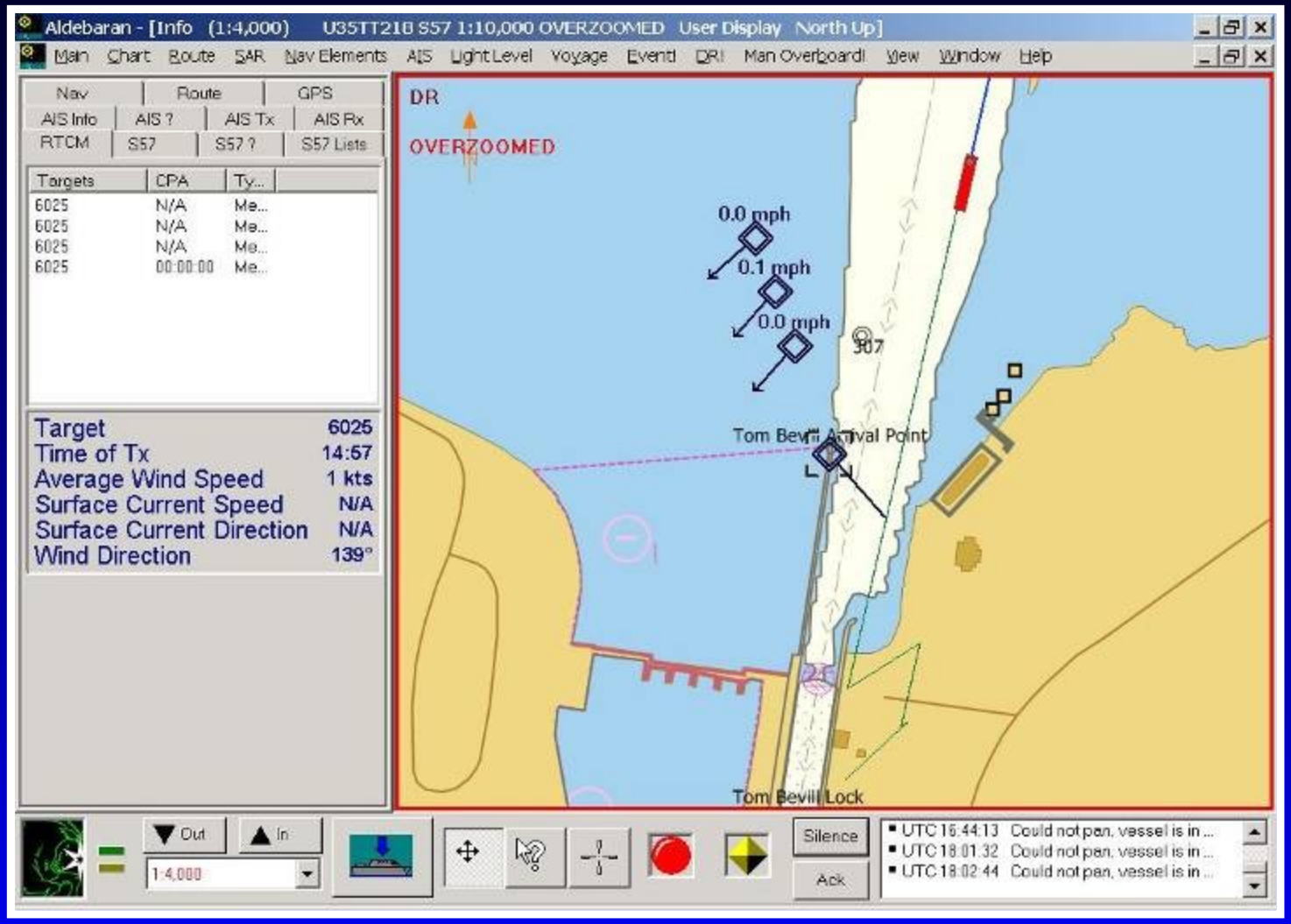
ADCP/Wind Control Station

Control Workstation

Current Vectors on IENC


Aldebaran - [True (1:2,000) US5TT218.S57 1:10,000 OVERZOOMED All Information Display North Up]
Main Chart Route SAR Nav Elements AIS Light Level Voyage Event! DR! Man Overboard! View Window Help
AIS Tx AIS Rx All Targets
Nav Route GPS AIS Info AIS ?
S57 S57 ? S57 Lists methydro
Target 6025
Latitude 33° 12' 44.82" N
Longitude 088° 17' 14.34" W
Time of Tx 14:25
Wind Direction 340°
Average Wind Speed 1 kts
Surface Current Direction N/A
Surface Current Speed N/A
Aid Type Status
DGPS
OVERZOOMED
0.3 Kts
1.0 Kts
0.5 Kts
1/16 Nm
1/32 Nm
0
1/64 Nm
3/64 Nm
Out In
1:2,000
Silence
Ack
UTC 17:56:35 Could not pan, vessel is in ...
UTC 17:56:47 Could not pan, vessel is in ...
UTC 18:03:38 Could not pan, vessel is in ...

Current Vectors on IENC


Aldebaran - [Info (1:4,000) U35TT218 S57 1:10,000 OVERZOOMED User Display North Up]
Main Chart Route SAR Nav Elements AIS Light Level Voyage Event! DR! Man Overboard! View Window Help
Nav Route GPS
AIS Info AIS ? AIS Tx AIS Rx
RTCM S57 S57 ? S57 Lists
Targets CPA Ty...
6025 N/A Me...
6025 N/A Me...
6025 N/A Me...
6025 00:00:00 Me...
Target 6025
Time of Tx 14:57
Average Wind Speed 1 kts
Surface Current Speed N/A
Surface Current Direction N/A
Wind Direction 139°
DR
OVERZOOMED
0.0 mph
0.1 mph
0.0 mph
307
Tom Bevill Arrival Point
Tom Bevill Lock
Out
In
1:4,000
Silence
Ack
UTC 16:44:13 Could not pan, vessel is in ...
UTC 18:01:32 Could not pan, vessel is in ...
UTC 18:02:44 Could not pan, vessel is in ...